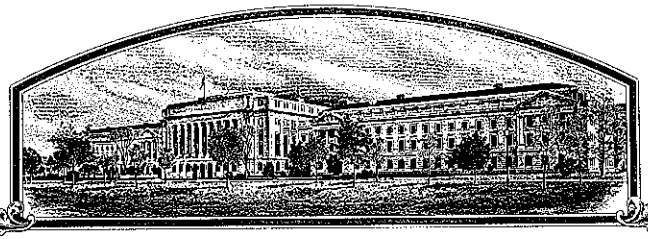


No. 9000183

# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

## Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

**Secretary of Agriculture**

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF eighteen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SOYBEAN

'9221'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D.C. *this* 30th *day of* November *in the year of our Lord one thousand nine hundred and ninety-three.*

*Attest:*

Kenneth H Evans

*Commissioner*
*Plant Variety Protection Office*
*Agricultural Marketing Service*

Mike Espy

*Secretary of Agriculture*

APPROVAL EXPIRES 2-28-88

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

# APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

*(Instructions on reverse)*

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

| 1. NAME OF APPLICANT(S) | 2. TEMPORARY DESIGNATION | 3. VARIETY NAME |
|---|---|---|
| Pioneer Hi-Bred International, Inc. | | 9221 |

| 4. ADDRESS *(Street and No. or R.F.D. No., City, State, and Zip Code)* | 5. PHONE *(Include area code)* | FOR OFFICIAL USE ONLY |
|---|---|---|
| 700 Capital Square<br>400 Locust Street<br>Des Moines, IA 50309 | 515-270-3300 | PVPO NUMBER<br>9000183 |

| 6. GENUS AND SPECIES NAME | 7. FAMILY NAME *(Botanical)* | FILING |
|---|---|---|
| Glycine Max | Leguminosae | DATE May 29, 1990<br>TIME ☐ A.M. ☐ P.M. |

| 8. KIND NAME | 9. DATE OF DETERMINATION | FEES RECEIVED |
|---|---|---|
| Soybean | October 1981<br>January 1988 (increase) | AMOUNT FOR FILING $ 2150.<br>DATE May 29, 1990<br>AMOUNT FOR CERTIFICATE $250.00<br>DATE November 8, 1993 |

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*

Corporation

| 11. IF INCORPORATED, GIVE STATE OF INCORPORATION | 12. DATE OF INCORPORATION |
|---|---|
| Iowa JH 15 NOV. 1993 | 1926 |

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

James E. Miller
7301 NW 62nd Ave., P.O. Box 85
Johnston, IA 50131-0085

Dennis Byron
7301 NW 62nd Ave.
Johnston, IA
50131-0085

~~Mary Helen Mitchell (copy)~~ JH 15 Nov. 1993
~~7250 NW 62nd Ave.~~
~~Johnston, IA 50131~~

PHONE *(Include area code)*:

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED

a. ☒ Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*
b. ☒ Exhibit B, Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety *(Request form from Plant Variety Protection Office.)*
d. ☐ Exhibit D, Additional Description of Variety.
e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act.)* ☐ Yes *(If "Yes," answer items 16 and 17 below)* ☒ No

| 16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? | 17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? |
|---|---|
| ☐ Yes ☒ No | ☐ Foundation ☐ Registered ☐ Certified |

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?

☐ Yes *(If "Yes," give date)*
☒ No

19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES ?

☐ Yes *(If "Yes," give names of countries and dates)*
☒ No

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

| SIGNATURE OF APPLICANT | DATE |
|---|---|
| James E. Miller | 5/11/90 |
| SIGNATURE OF APPLICANT | DATE |
| | |

FORM LS-470 (3-86) *Edition of 7-84 obsolete.*

**Attachment:** 9221 Soybean (March, 1990)

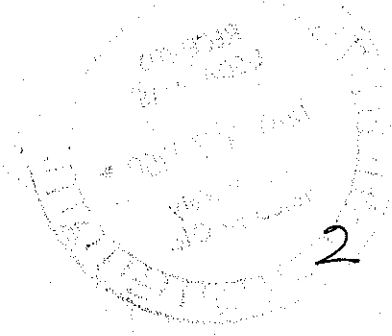
**Exhibit A:** Variety 9221 evolved from a cross of variety 1677 x variety Franklin. It is an F5-derived variety which was advanced to the F5 generation by modified single-seed descent. The F6 progeny row of 9221 was grown in Iowa during the summer of 1981. Subsequently, 9221 has undergone eight years of extensive testing and purification and has been observed by the breeder to be uniform and stable for all plant traits from generation to generation, with no evidence of variants.

Seed hila of variety 9221 are light buff in color, and under certain environmental conditions may appear yellow in color. When seeds of this type are planted, they produce plants having seeds with light buff hila.

Six acres of 9221 (breeders seed) were grown in 1987. 36 acres of parent seedstock (foundation seed equivalent) were grown in 1989.

Exhibit B: Variety 9221 most closely resembles the variety CN210. Both varieties have purple flowers, gray pubescence, and yellow seeds with buff hila. However, CN210 exhibits a low seed coat protein peroxidase activity, whereas 9221 has a high peroxidase activity.

Exhibit E: Pioneer Hi-Bred International, Inc. is the sole, original, and first breeder of soybean variety 9221, for which it solicits a certificate of protection.



FORM APPROVED: OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN & SEED DIVISION
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MARYLAND 20705

EXHIBIT C
*(Soybean)*

# OBJECTIVE DESCRIPTION OF VARIETY
## *SOYBEAN (Glycine max* L.*)*

| NAME OF APPLICANT(S) | TEMPORARY DESIGNATION | VARIETY NAME |
|---|---|---|
| Pioneer Hi-Bred International, Inc. | | 9221 |

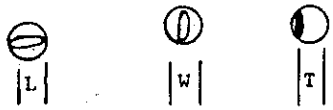
ADDRESS *(Street and No., or R.F.D. No., City, State, and Zip Code)*
700 Capital Square
400 Locust Street
Des Moines, IA 50309

FOR OFFICIAL USE ONLY
PVPO NUMBER
9000183

Choose the appropriate response which characterizes the variety in the features described below. When the number of significant digits in your answer is fewer than the number of boxes provided, place a zero in the first box when number is 9 or less (e.g., [0][9]). Starred characters ★ are considered fundamental to an adequate soybean variety description. Other characters should be described when information is available.

**1. SEED SHAPE:**

[1]




1 = Spherical (L/W, L/T, and T/W ratios = < 1.2)
2 = Spherical Flattened (L/W ratio > 1.2; L/T ratio = < 1.2)
3 = Elongate (L/T ratio > 1.2; T/W = < 1.2)
4 = Elongate Flattened (L/T ratio > 1.2; T/W > 1.2)

★ **2. SEED COAT COLOR: (Mature Seed)**

[1] 1 = Yellow 2 = Green 3 = Brown 4 = Black 5 = Other *(Specify)* _____

**3. SEED COAT LUSTER: (Mature Hand Shelled Seed)**

[1] 1 = Dull ('Corsoy 79'; 'Braxton') 2 = Shiny ('Nebsoy'; 'Gasoy 17')

★ **4. SEED SIZE: (Mature Seed)**

[1][5] Grams per 100 seeds

★ **5. HILUM COLOR: (Mature Seed)**

[1] 1 = Buff 2 = Yellow 3 = Brown 4 = Gray 5 = Imperfect Black 6 = Black 7 = Other *(Specify)* _____

★ **6. COTYLEDON COLOR: (Mature Seed)**

[1] 1 = Yellow 2 = Green

★ **7. SEED PROTEIN PEROXIDASE ACTIVITY:**

[2] 1 = Low 2 = High

★ **8. SEED PROTEIN ELECTROPHORETIC BAND:**

[-] 1 = Type A ($SP1^a$) 2 = Type B ($SP1^b$)

★ **9. HYPOCOTYL COLOR:**

[3] 1 = Green only ('Evans'; 'Davis') 2 = Green with bronze band below cotyledons ('Woodworth'; 'Tracy')
3 = Light Purple below cotyledons ('Beeson'; 'Pickett 71')
4 = Dark Purple extending to unifoliate leaves ('Hodgson'; 'Coker Hampton 266A')

★ **10. LEAFLET SHAPE:**

[3] 1 = Lanceolate 2 = Oval 3 = Ovate 4 = Other *(Specify)* _____

3

**11. LEAFLET SIZE:**

[2] 1 = Small ('Amsoy 71'; 'A5312') 2 = Medium ('Corsoy 79'; 'Gasoy 17') 3 = Large ('Crawford'; 'Tracy')

**12. LEAF COLOR:**

[2] 1 = Light Green ('Weber'; 'York') 2 = Medium Green ('Corsoy 79'; 'Braxton') 3 = Dark Green ('Gnome'; 'Tracy')

★ **13. FLOWER COLOR:**

[2] 1 = White 2 = Purple 3 = White with purple throat

★ **14. POD COLOR:**

[2] 1 = Tan 2 = Brown 3 = Black

★ **15. PLANT PUBESCENCE COLOR:**

[1] 1 = Gray 2 = Brown (Tawny)

**16. PLANT TYPES:**

[2] 1 = Slender ('Essex'; 'Amsoy 71') 2 = Intermediate ('Amcor'; 'Braxton') 3 = Bushy ('Gnome'; 'Govan')

★ **17. PLANT HABIT:**

[3] 1 = Determinate ('Gnome'; 'Braxton') 2 = Semi-Determinate ('Will') 3 = Indeterminate ('Nebsoy'; 'Improved Pelican')

★ **18. MATURITY GROUP:**

[0][5] 1 = 000 2 = 00 3 = 0 4 = I 5 = II 6 = III 7 = IV 8 = V 9 = VI 10 = VII 11 = VIII 12 = IX 13 = X

★ **19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)**

BACTERIAL DISEASES:

★ [0] Bacterial Pustule *(Xanthomonas phaseoli* var. *sojensis)*

★ [0] Bacterial Blight *(Pseudomonas glycinea)*

★ [0] Wildfire *(Pseudomonas tabaci)*

FUNGAL DISEASES:

★ [0] Brown Spot *(Septoria glycines)*

Frogeye Leaf Spot *(Cercospora sojina)*

★ [0] Race 1 [0] Race 2 [0] Race 3 [0] Race 4 [0] Race 5 [ ] Other *(Specify)* _____

[0] Target Spot *(Corynespora cassiicola)*

[0] Downy Mildew *(Peronospora trifoliorum* var. *manshurica)*

[0] Powdery Mildew *(Microsphaera diffusa)*

★ [0] Brown Stem Rot *(Cephalosporium gregatum)*

[0] Stem Canker *(Diaporthe phaseolorum* var. *caulivora)*

**19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant) (Continued)**

FUNGAL DISEASES: (Continued)

★ [0] Pod and Stem Blight *(Diaporthe phaseolorum* var; *sojae)*

[0] Purple Seed Stain *(Cercospora kikuchii)*

[0] Rhizoctonia Root Rot *(Rhizoctonia solani)*

Phytophthora Rot *(Phytophthora megasperma* var. *sojae)*

★ [2] Race 1 [2] Race 2 [0] Race 3 [0] Race 4 [0] Race 5 [0] Race 6 [0] Race 7

[0] Race 8 [ ] Race 9 [ ] Other *(Specify)* _____

VIRAL DISEASES:

[0] Bud Blight (Tobacco Ringspot Virus)

[0] Yellow Mosaic (Bean Yellow Mosaic Virus)

★ [0] Cowpea Mosaic (Cowpea Chlorotic Virus)

[0] Pod Mottle (Bean Pod Mottle Virus)

★ [0] Seed Mottle (Soybean Mosaic Virus)

NEMATODE DISEASES:

Soybean Cyst Nematode *(Heterodera glycines)*

★ [0] Race 1 [0] Race 2 [2] Race 3 [1] Race 4 [ ] Other *(Specify)* _____

[0] Lance Nematode *(Hoplolaimus Colombus)*

★ [0] Southern Root Knot Nematode *(Meloidogyne incognita)*

★ [0] Northern Root Knot Nematode *(Meloidogyne Hapla)*

[0] Peanut Root Knot Nematode *(Meloidogyne arenaria)*

[0] Reniform Nematode *(Rotylenchulus reniformis)*

[ ] OTHER DISEASE NOT ON FORM *(Specify)*: _____

**20. PHYSIOLOGICAL RESPONSES: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)**

★ [1] Iron Chlorosis on Calcareous Soil

[ ] Other *(Specify)* _____

**21. INSECT REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)**

[0] Mexican Bean Beetle *(Epilachna varivestis)*

[0] Potato Leaf Hopper *(Empoasca fabae)*

[ ] Other *(Specify)* _____

**22. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED.**

| CHARACTER | NAME OF VARIETY | CHARACTER | NAME OF VARIETY |
|---|---|---|---|
| Plant Shape | 9191 | Seed Coat Luster | CN210 |
| Leaf Shape | -- | Seed Size | 9191 |
| Leaf Color | CN210 | Seed Shape | 1677 |
| Leaf Size | CN210 | Seedling Pigmentation | 1677 |
| | | | |

**23. GIVE DATA FOR SUBMITTED AND SIMILAR STANDARD VARIETY: Paired Comparison Data**

| VARIETY | NO. OF DAYS MATURITY | PLANT LODGING SCORE | CM PLANT HEIGHT | LEAFLET SIZE | | SEED CONTENT | | SEED SIZE G/100 SEEDS | NO. SEEDS/ POD |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CM Width | CM Length | % Protein | % Oil | | |
| 9221 Submitted | 115.1 | 1.5 | 83 | -- | -- | -- | -- | 14.8 | -- |
| CN210 Name of Similar Variety | 114.7 | 2.1 | 96 | -- | -- | -- | -- | 18.3 | -- |

**PUBLICATIONS USEFUL AS REFERENCE AIDS FOR COMPLETING THIS FORM:**


1. Caldwell, B.E., ed. 1973. Soybeans: Improvement, Production, and Uses. Amer. Soc. Agron. Monograph No. 16.
2. Buttery, B.R. and R.I. Buzzell. 1968. Peroxidase activity in seeds of soybean varieties. Crop Sci., 8: 722-725.
3. Hymowitz, T. 1973. Electrophoretic analysis of SBTI-$A_2$ in the USDA soybean germplasm collection. Crop Sci., 13: 420-421.
4. Payne, R.C. and L.F. Morris. 1976. Differentiation of soybean cultivars by seedling pigmentation patterns. J. Seed Technol. 1: 1-19.

Amendment to PVP Application No. 9000183. February, 1993

Table 1a. Variety '9221' vs 'CN290' for percent oil content.

All observations are from bulked seed harvested from research plots. Research plots were planted using a randomized complete block design. Planted plot length was at least 10 feet. Percent oil content was determined using a Tecator 1255 NIR spectrophotometer. All data was taken in 1992.

1992

| REP | 9221 X1 | CN290 X2 | X1-X2 | (X1-X2)**2 |
|---|---|---|---|---|
| 1 | 19.4 | 16.7 | 2.7 | 7.29 |
| 2 | 19 | 16.6 | 2.4 | 5.76 |
| 3 | 19.2 | 16.8 | 2.4 | 5.76 |
| 4 | 19.4 | 16.8 | 2.6 | 6.76 |
| 5 | 19.1 | 16.6 | 2.5 | 6.25 |
| 6 | 19.5 | 16.2 | 3.3 | 10.89 |
| sum | 115.6 | 99.7 | 15.9 | 42.71 |
| ave | 19.27 | 16.62 | 2.65 | |

SD**2= (42.71-(15.9**2)/6)/(6*5)
SD**2= 0.01917
SD= 0.13844
t = 2.65/0.13844
t = 19.1414 ** significant 1% level
DF= 5

n group of individuals = 6

ave oil content of 9221 = 19.2667
ave oil content of CN290 = 16.6167

Derivation of oil data presented in Table 1.

In our best scientific judgement, the oil data presented in Table ~~1~~ 1.a fairly and accurately describes difference between variety '9221' and variety 'CN290'. This judgement is based upon the method of plot harvest, method of seed storage, and characteristics of the NIR instrument. 15 Nov. 1993

Plots are grown in a randomized complete block design. Harvest occurs after the pods have dried to the point that they will thresh completely. At this point the moisture differences of varieties of the same maturity is generally not more than two percent. Often it is considerably less.

Seed from research plots is typically dried or allowed to equilibrate before weighing, at which point moisture differences are very small. In this set of data the largest moisture difference observed during weighing of these two varieties was 0.7%. The average moisture difference of plots later sampled for oil determination was 0.2%.

Following weighing, seed samples are stored from several weeks to several months in cloth bags. During this period samples reach a stable uniform moisture.

These seed samples are then analyzed using a Tecator 1255 NIR Spectophotometer. The machine has been calibrated with samples analyzed at Woodson-Tenent Laboratories using acredited methods. The calibration data virtually identical to that which comes from the standard FGIS calibration. In addition, the 1255 adjusts for moisture differences. Since samples with various moistures have been used to calibrate the machine, moisture is effectively eliminated from the prediction equation. Data presented is the percent oil of a sample corrected to 0% moisture.